

REMARKS

With this amendment, claim 10 has been amended to correct a typographical error and to improve clarity. Further, the specification has been amended to update priority information and to correct for a typographical error. Accordingly, no new matter has been introduced. Further, claims 13, 28, and 35 have been cancelled without prejudice. Upon entry of the present amendment, claims 10-2, 15-27, 29-34, 36, and 37 will be pending in the instant application.

In the January 15, 2003 Office Action, the Examiner:

- Objected to Fig. 1 for including a reference sign that should read “847”;
- Objected to the Specification in order to insure that the status of priority information appearing in the specification is updated;
- Rejected claims 10, 13, and 14 under 35 U.S.C. § 102(b) as being anticipated by United States Patent 5,596,601 to Bar-David (hereinafter “Bar-David”);
- Rejected claims 12, 24, 25, 28, and 30 under 35 U.S.C. § 103(a) as being unpatentable over Bar-David;
- Rejected claims 18-23, 29, 31, 33, and 35-37 under 35 U.S.C. § 103(a) as being unpatentable over Bar-David, in view of United States Patent 5,151,702 to Urkowitz (hereinafter “Urkowitz”); and
- Rejected claims 10-17, 24-28, 30-35, and 37 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5, 9, and 10 of United States Patent No. 6,331,997.

DRAWING OBJECTION

The Examiner has objected to Fig. 1 for failure to include a reference sign mentioned in the specification. With this response, Applicants submit a corrected Fig. 1. Changes to Fig. 1 are indicated in the copy of this Figure in Exhibit A, with the changes indicated in red. A courtesy copy of the formal drawings, including the corrected version of Fig. 1, is attached hereto as Exhibit B. Accordingly, Applicants respectfully request the objection be withdrawn.

OBJECTION TO THE SPECIFICATION

The Examiner has objected to the specification for failure to include updated status information for priority documents. With this amendment, Applicants have amended the specification to insert “now U.S. Patent No. 6,331,997 issued Dec. 18, 2001” after “2000.” Accordingly, Applicants request that the objection be withdrawn.

THE REJECTION UNDER 35 U.S.C. § 102 SHOULD BE WITHDRAWN

Claims 10, 13, and 14 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Bar-David. With respect to claim 13, the rejection is moot because Applicants have cancelled the claim. The rejection of Claims 10 and 14 are traversed for the following reasons.

To anticipate a claim, a reference must teach every element of the claim (*see* § 2131 of The Manual of Patent Examining Procedure, Original Eight Edition, August 2001, Revised February 2003). Anticipation requires that all the elements and limitations of the claim be found within a single prior art reference. There must be no difference between the claimed invention and the reference disclosed, as viewed by a person of ordinary skill in the art in the field of the invention. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565 (Fed. Cir. 1991).

Claim 10, as amended, recites the generation of a plurality of pulse-trains each comprising a plurality of pulses separated by intervals, wherein each one of the plurality of intervals of a pulse-train is unequal in duration to another interval of the pulse-train. The Examiner asserts that Bar-David teaches this limitation. On page 3 of paper number 5 (May 23, 2001 office action) of parent application serial number 09/501,666 (now United States Patent 6,331,997), the Examiner states:

Bar-David teaches generating pulses and codewords. Bar-David teaches generating time pulses in accordance with the symbol generation period. Regarding different time intervals between pulses, shifting pulses will provide different time intervals between pulses (see column 5, lines 56 - column 6, line 61, column 8, claims 1 and 2).

In the present office action, the Examiner refers to the abstract, column 1, line 65, through column 2, line 27, column 3, lines 5-58, column 4, lines 13-25, and Figs. 1-3 of Bar-David to support the contention that Bar-David disclosed generating a plurality of pulse-trains each having a plurality of pulses separated by intervals in which each one of the plurality of

intervals of a respective one of the pulse-trains is unequal in duration to another interval of the respective pulse-train. The Examiner's contention, however, that Bar-David discloses intervals of a pulse-train that are unequal in duration is unfounded.

The meaning of "interval" in claim 10 and Applicants' specification is understood with reference to Applicants' Fig. 1. Each of the sixteen code words in Fig. 1 is defined by sixteen pulses (each of the sixteen pulses being either positive or negative, and hence each of the positive or negative pulses defining a logical 1 or a logical 0). The intervals between each of the pulses, from one pulse to the next, are all unequal. For instance, the example of Fig. 1 has the sixteen unequal intervals of unequal durations 38, 40, 42, 44, 46, 48, ... (see Applicants' column 4, lines 64-66).

In contrast to the unequal intervals in the claimed invention, column 3, lines 17-27, of Bar-David discloses spread spectrum codes such as Barker codes that have binary values (a logical 1 or a logical 0) defined by equal intervals. As described in column 1, lines 31-40, of Bar-David, the defined Barker code has a pattern of eleven *chips*, represented by a sequence of logical 0's and logical 1's, namely "00011101101". Specifically and incorporating the inherent definition of "chip" (sometimes called "bit"), an eleven chip Barker code has a defined pattern of eleven binary values (logical 1 or logical 0) each binary value represented by an equal time duration, that is, by an equal time interval.

The equal time intervals in the spread spectrum codes of Bar-David result in equal intervals between the peaks of the uniformly distributed side-lobe values of the auto-correlation function at the output of a matched filter of the code as illustrated in Fig. 1 of Bar-David. From inspection of the equal side-lobe intervals of Fig. 1, there can be no question that Bar-David is only concerned with equal intervals and not with unequal intervals.

By way of contrast, the unequal time intervals between pulses in the code words of Applicants' invention (as clearly shown in Applicants' Fig. 1) results in unequal interval clustering of the side-lobes of the auto-correlation functions (see Applicants' Figs. 2 and 3) and the unequal interval clustering between the side-lobes of the cross-correlation functions (see Applicants' Figs. 4 and 5). In each of these figures of Applicant, the side lobes only have a plus or minus 1 value, but are more densely clustered toward the main lobe, a phenomena having no parallel in the equal interval spacing of Bar-David.

Contrary to the Examiner's assertions, all intervals for chips in Bar-David are always equal. When Bar-David time-shifts, it is done without changing the chip intervals. If Bar-David did not use equal chip intervals when doing time-shifts, then the auto-correlation and cross-correlation function of Bar-David would not work. The Examiner's suggestion that

Bar-David could use unequal intervals would render Bar-David inoperative. To be operative, Bar-David shifts complete code words such that each chip within the codeword is shifted by the same amount thereby maintaining the original equal chip duration. Column 5, lines 9-21, of Bar-David explains:

In one embodiment, discussed further below, the position of the main lobe, upon matched filtering, may be manipulated within the defined symbol period by delaying the transmission of the **codeword**, by a positive or negative time period. Thus, in an implementation using an eleven chip codeword, if it is desired to position the main lobe in position 8, rather than in position 6, the natural position of the main lobe, the codeword generator should delay the transmission of the **codeword** by 2/11 of the symbol period. Similarly, if it is desired to position the main lobe in position 2 rather than in position 6, the codeword generator should advance the transmission of the **codeword** by 4/11 of the symbol period. (*emphasis added*)

The codeword shifting used by Bar-David is capable of transmitting additional bits per bit symbol duration by shifting the **codeword**. Although, the codeword shifting adjusts the position of the main lobe in the auto-correlation function such that main lobe position conveys this additional information, the shifting does not change the equal chip durations in a codeword. See column 5, line 56, through column 6, line 61, of Bar-David to understand how a complete code-word is time-shifted as a function of the code sequence.

By way of summary, the time durations of chips of Bar-David are equal always and therefore, Bar-David does not anticipate claim 10. Claim 14 depends from claim 10 and is therefore patentable over Bar-David for at least for the same reasons that claim 10 is patentable over Bar-David. Therefore, Applicants respectfully request that the rejection of claims 10 and 14 be withdrawn.

THE REJECTIONS UNDER 35 U.S.C. § 103 SHOULD BE WITHDRAWN

To reject claims in an application under 35 U.S.C. § 103, the PTO bears the initial burden of establishing a prima facie case of obviousness. *In re Bell*, 26 USPQ2d 1529, 1530 (Fed. Cir. 1993). In order to establish prima facie obviousness, three basic criteria must be met. First, the prior art must provide one of ordinary skill in the art with a suggestion or motivation to modify or combine the teachings of the references relied upon by the PTO to arrive at the claimed invention. *WMS Gaming Inc. v. International Game Technology*, 51 USPQ2d 1385, 1397 (Fed. Cir. 1999). Second, the prior art must provide one of ordinary

skill in the art with a reasonable expectation of success. See *In re O'Farrell*, 7 USPQ2d 1673 (Fed. Cir. 1988); *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Third, the prior art, either alone or in combination, must teach or suggest each and every limitation of the rejected claims. See *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991); *In re Royka and Martin* 180 USPQ 580 (C.C.P.A. 1974); and *In re Wilson* 165 USPQ 494 (C.C.P.A. 1970). If any one of these criteria are not met, prima facie obviousness is not established.

In the present instance, the cited art fails to satisfy the requirement that the prior art, either alone or in combination, teach or suggest each and every limitation of the rejected claims.

Claims 12, 24, 26, 28, and 30. The Examiner has rejected claims 12, 24, 26, 28, and 30 under 35 U.S.C. § 103(a) as being unpatentable over Bar-David. With respect to claim 28, the rejection is moot because Applicants have cancelled the claim. With respect to claims 12, 24, 26, and 30, Applicants traverse the rejection. Claims 12, 24, 26, and 30 each disclose, or depend from a claim that discloses a train of pulses separated by intervals that are unequal in duration with respect to each other. As discussed in the 35 U.S.C. § 102 rejection above, Bar-David does not disclose or suggest such a feature.

Claims 12 and 26 are patentable over Bar-David for the additional reason that they recite the limitation that the duration of any one interval in a pulse train is unequal to a sum of the durations of any other two intervals in the pulse-train. The Examiner states that such a feature is a matter of design choice. However, Applicants have disclosed that the use of such a pulse sequence helps reduce the side-lobe values of auto-correlations and cross-correlation functions of the code words. See page 6, line 10, through page 8, line 15, for a discussion of the advantages the limitations of claims 12 and 26 provide in the field of multiple access codes for CDMA systems. Therefore, for the reasons identified, Applicants respectfully request that the rejection of claims 12, 24, 26, and 30 under 35 U.S.C. § 103 be withdrawn.

Claims 18-23, 29, 31, 33, and 35-37. The Examiner has rejected claims 18-23, 29, 31, 33, and 35-37 under 35 U.S.C. § 103(a) as being unpatentable over Bar-David, in view of United States Patent 5,151,702 to Urkowitz (hereinafter "Urkowitz"). With respect to claim 35, the rejection is moot because Applicants have cancelled the claim. With respect to the other rejected claims, Applicants respectfully traverse the rejection.

Each of claims 18-23, 29, 31, 33, 36, and 37 discloses or depends from a claim that discloses a train of pulses separated by intervals that are unequal in duration with respect to

each other. As discussed above, Bar-David does not teach or suggest this feature. Urkowitz discloses pulse compression techniques, including the use of Barker codes. However, Urkowitz does not disclose a train of pulses separated by intervals that are unequal in duration with respect to each other. Thus, Urkowitz fails to remedy the deficiency in Bar-David. Claim 33 is patentable over the combination of Bar-David and Urkowitz for the additional reason that it recites the limitation that the duration of any one interval in a pulse train is unequal to a sum of the durations of any other two intervals in the pulse-train. The Examiner states that such a feature is a matter of design choice. However, as discussed in the response to the 103 rejection of claims 12, 24, 26, 28, and 30 above, Applicants have disclosed that the use of such a pulse sequence helps reduce the side-lobe values of auto-correlations and cross-correlation functions of the code words. Therefore, for the reasons identified, Applicants respectfully request that the rejection of claims 18-23, 29, 31, 33, 36, and 37 under 35 U.S.C. § 103 be withdrawn.

DOUBLE PATENTING REJECTION

The Examiner has rejected claims 10-17, 24-28, 30-35, and 37 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5, 9, and 10 of United States Patent No. 6,331,997. Although Applicants do not necessarily agree with the Examiner's reasoning for the double patenting rejection articulated in the January 15, 2003 office action, in order to expedite prosecution, Applicants hereby enclose a Terminal Disclaimer that disclaims the terminal part of any patent granted on the instant application which would extend beyond the expiration date of United States Patent Number 6,331,997. Therefore, Applicants respectfully request that the rejection of claims 10-17, 24-28, 30-35, and 37 under the judicially created doctrine of obviousness-type double patenting be withdrawn.

CONCLUSION

Applicants respectfully request entry of the foregoing amendments and remarks into the file of the above-identified application. Applicants believe that each ground for rejection has been successfully overcome or obviated, and that all the pending claims are in condition for allowance. Withdrawal of the Examiner's rejections and allowance of the application are respectfully requested.

Respectfully submitted,

Brett Lovejoy Reg. No. 42,813
for

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Thomas D. Kohler Reg. No. 32,797
PENNIE & EDMONDS LLP
3300 Hillview Avenue
Palo Alto, CA 94304
650-493-4935